Diversity in the Living Marine Resource

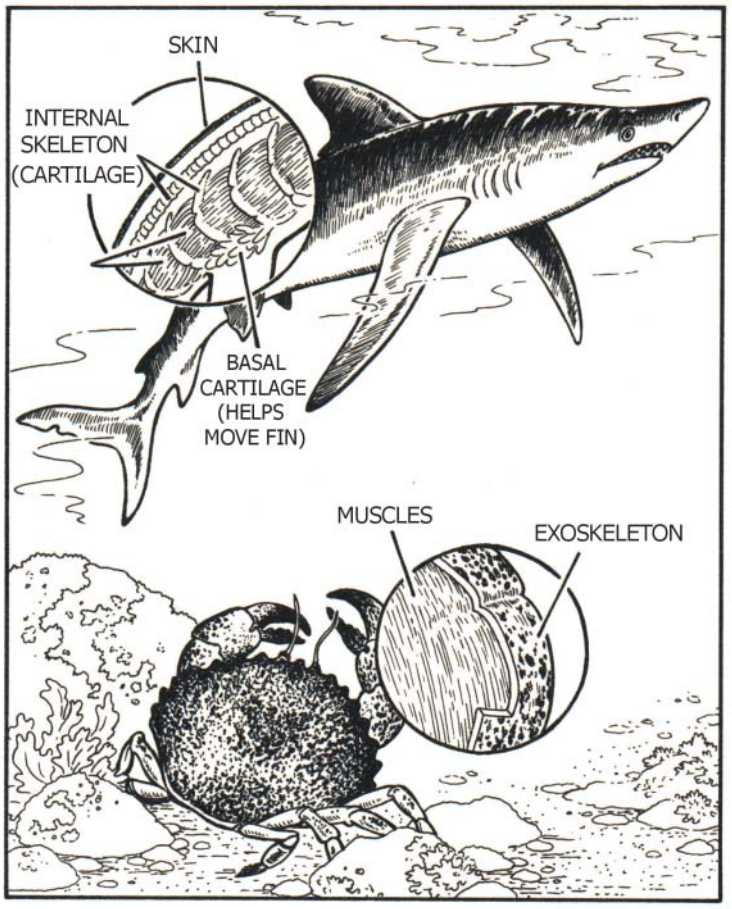
Have you ever thought about the variety of marine animals that live beneath the surface of California's ocean waters? It's easy to appreciate the diversity of life here if you are a scuba diver or by watching a television program about marine animals. From sea urchins that look like thorny sponges to soft-bodied squid and colorful fish, California's marine resources come in many unique and interesting sizes and shapes.

There are even more variations among living things that can be discovered if you look at the internal structures inside of them. Creatures of the sea are made up of systems of organs and specialized tissues that provide for their essential life functions. Some structures allow for getting oxygen to cells. Sets of organs provide for capturing and digesting nutrients and others for sensing the environment. Systems in different animals provide for similar needs – but with very different physical structures.

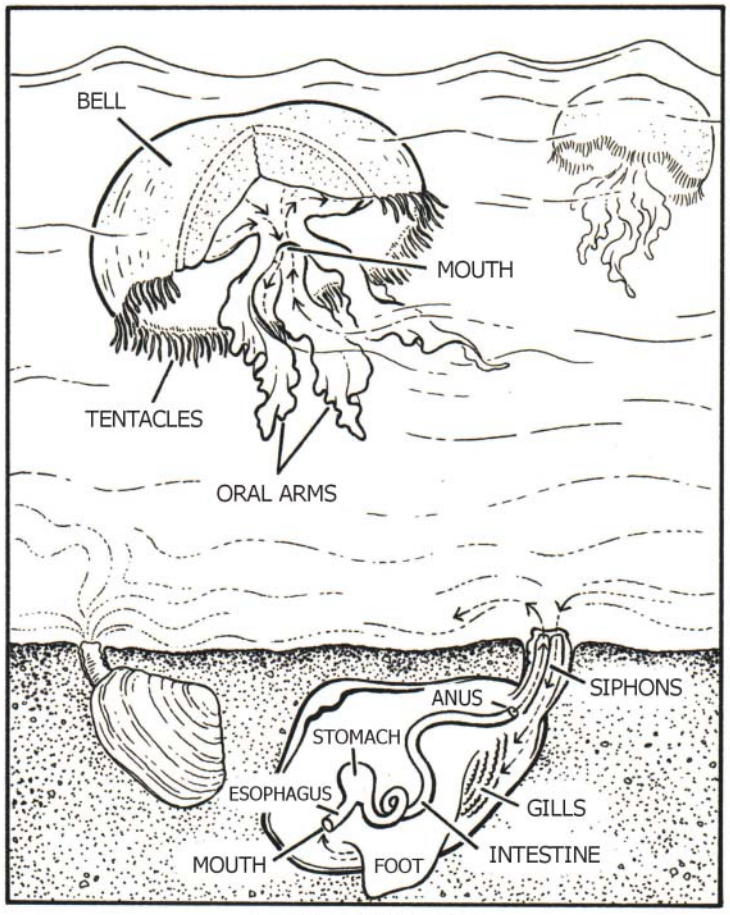
To illustrate structure and function let's take a look at a few organ systems in marine animals and the way the structures are designed to work. In many animals, bones and muscles work together to create movement. As an example, a blue shark has an internal skeleton made of soft cartilage where muscles tug on the surface of bones. This partnership of muscle and bone lets the shark move and change direction as it glides through the sea.

A different example is shown with the Dungeness crab as it uses similar structures to open and close a large pincer claw. Its muscles, however, tug upon the inside walls of a hollow exoskeleton that covers the outside of the crab's body. From arrangements of bones and muscles to varying kinds of body structures that carry out other living processes, marine creatures show a wide range of forms from simple to complex.

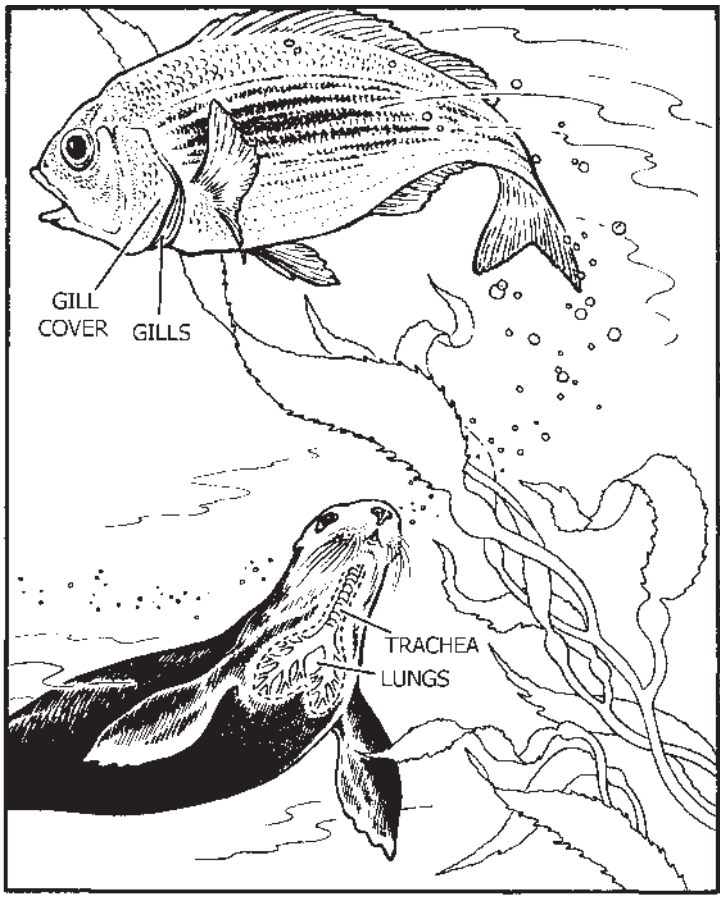
Eating and breathing are two things we humans do, often without much thought. But have you ever stopped to think about how a jellyfish digests its food? Interestingly, it has only one entrance to its body and uses the same opening for taking in food as it does for getting rid of what it doesn't want. That makes even a simple clam seem very advanced because it has a complete digestive tract. This includes a mouth for taking in food, a set of organs for getting the nutrients and a completely separate opening for expelling wastes.



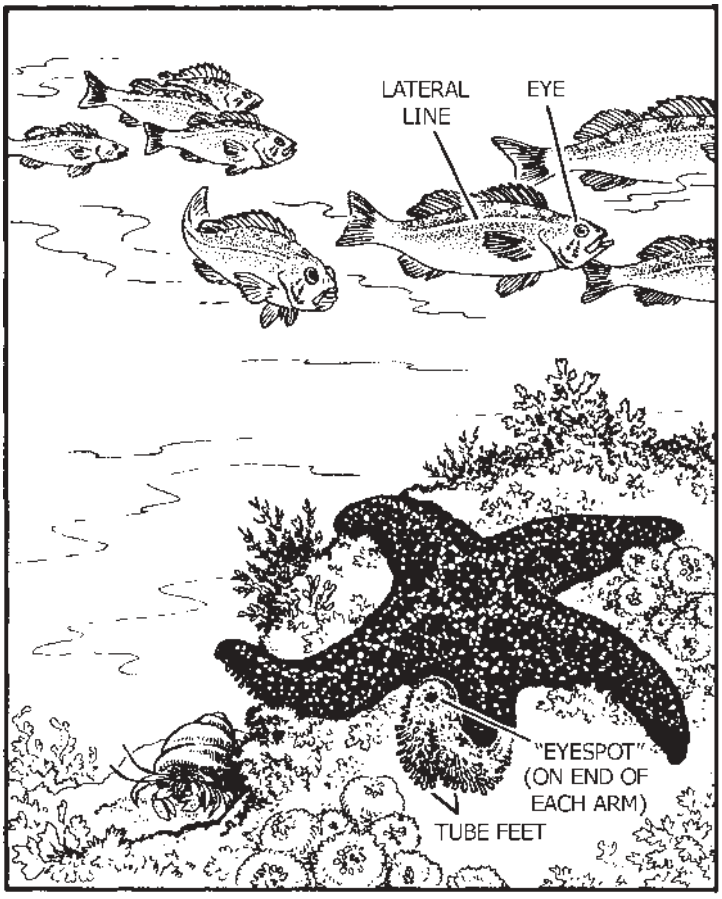
SKELETAL MUSCLES



DIGESTIVE SYSTEMS



RESPIRATORY SYSTEMS



SENSORY ORGANS

When comparing the physical features of marine animals you might consider that the structures of simple animals are very similar to fossils of early animal life forms. Fossilized designs showing only simple body structures are found in older layers of rock. More complex body systems as seen in advanced marine animals are thought to have evolved later in time. The complex structures appear only in more recent fossil records.

A sea lion, for instance, is quite an advanced creature. It is well adapted for life in the water, but it retains some ability to haul out on the land. A sea lion makes a good comparison to the simpler surf perch, a favorite prey of the marine mammal. Hearts and blood vessels inside both of these animals work very much alike. The perch must swim quickly to avoid this hunter's chase.

Both predator and prey need to get oxygen to their body's cells in order to move swiftly. The sea lion, however, has lungs designed for inhaling and exhaling above the water's surface. If the chase does not soon produce a successful catch the sea lion must give up and return to the surface for a breath of air. By contrast, the surf perch is able to meet its needs through gill structures that can get dissolved oxygen directly from the water.

As you can see, systems providing important life functions can do the job using completely different structures. Here's one more example to consider. This one involves some ways that marine animals can sense their environment. A sea star moving slowly on the bottom uses hundreds of tiny tube feet for locomotion. These same tube feet are highly sensitive and may withdraw quickly when exposed or clamp down tightly on a rock when protection is needed. This animal also has a light sensitive "eyespot" that helps it orient directions for itself. An eyespot is primitive, indeed, when compared with the eyes of an olive rockfish, especially a school of olive rockfish.

With olfactory sensors for chemical "tasting" of the environment and sound-sensitive internal ears as well, a school of olive rockfish moves together like a smooth underwater ballet. Amazingly, the secret in their close motions is not because of structures for sight, smell or sound. Many fish, including olive rockfish, possess a lateral line running down the sides of their bodies. These electro-magnetic sensors function as a built-in radar system for telling precisely how far away their neighbor is swimming.